A NEW *ENCELIA* (ASTERACEAE: HELIANTHEAE) FROM BAJA CALIFORNIA

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ABSTRACT

Encelia densifolia Clark & Kyhos, from the isolated Picachos de Santa Clara in northern Baja California Sur, is morphologically distinctive, having short peduncles, broad obovate phyllaries, and remotely dentate leaves.

RESUMEN

Encelia densifolia Clark & Kyhos, de los aislados Picachos de Santa Clara en el norte de Baja California Sur, es distinto morfológicamente, con pedúnculos cortos, filarios largos y obovados, y hojas remotamente dentadas.

In 1947, H. S. Gentry made two collections of a new *Encelia* from the Picachos de Santa Clara that he later labeled "*Encelia densifolia*", but never formally published. We have recollected the species and studied it in the field and in cultivation to understand better its relationships with other members of the genus, and describe it here.

Encelia densifolia Clark & Kyhos, sp. nov.
Encelia densifolia H. S. Gentry, nom. ined. herb., *Gentry 7757,* 5–10 Nov 1947.

Frutex erectus vel aliquantum effusus, usque ad 1.5 m altus. Folia 14–65 mm longa, 7–35 mm lata, griseo-prasina, pilosa, rigide divergentia vel ascendentia, ovata, plerumque dentata, petiolis alatis. Capitula solitaria, floribus 20–30 mm latis trans flores radiantes, fructibus plerumque pendula. Pedunculi breves (7–30 mm longi), minute pubentes. Involucra 11–15 mm longa, 9–13 mm lata. Phyllaria 3–6 mm lata, 7–10 mm longa, imbricata, obovata, minute pubentia, marginibus ciliatae. Flores radiantes 7–12 mm longi, flavi, lucem ultraviolaceum reflectentes. Flores disci flavi, lucem ultraviolaceum absorbentes. Antherae porphyreae aureaeve. Stigmata flava. Achenia obovata, compressa, in superficie plana glabra pro parte

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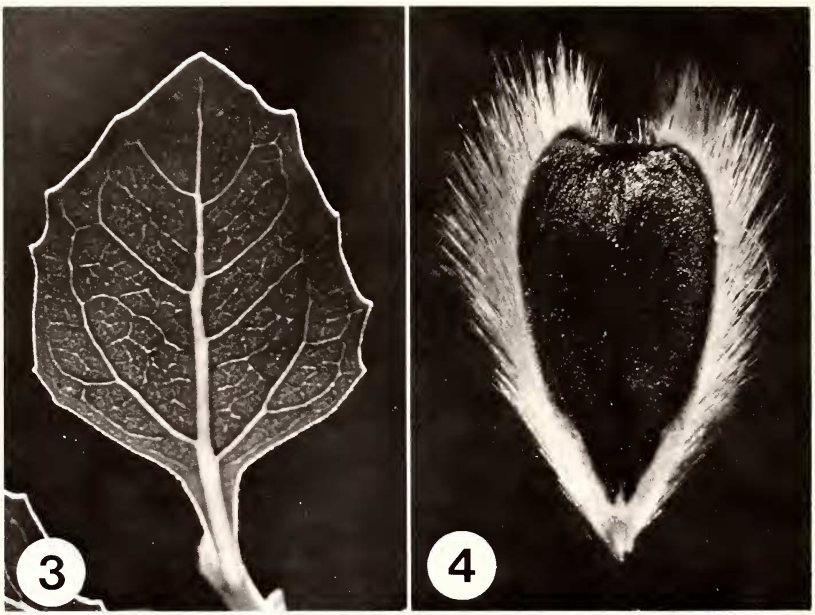
FIGS. 1, 2. *Encelia densifolia* (*Clark 585*). 1. Capitulum in flower. 2. Capitulum in early fruit, showing pendulous habit and enlarged phyllaries. Photographs taken in the field in the vicinity of the type specimen (×2.2).



FIGS. 3, 4. *Encelia densifolia*. 3. Leaf (transilluminated to emphasize venation), ×2. 4. Achene, ×10. Photographs taken of plants grown from seed (*Clark 585*) in outdoor cultivation.

maxima, in margine ciliata, sine aristis, ad apicem incisura lata et non profunda. Chromosomatum gametophytorum numerus 18 (Figs. 1–4).

Erect or occasionally spreading shrub, to 1.5 m tall. Leaves 14–65 mm long, 7–35 mm wide, gray-green, pilose, rigidly divergent or ascending, ovate, usually remotely dentate, petioles winged. Capitula solitary, 20–30 mm wide across the rays in flower, pendulous in fruit. Peduncles short (7–30 mm long), minutely pubescent. Involucre 11–15 mm long, 9–13 mm wide. Phyllaries 3–6 mm wide, 7–10 mm long, imbricate, obovate, minutely pubescent, margins ciliate. Ray florets 7–12 mm long, yellow, reflecting ultraviolet. Disc florets yellow, absorbing ultraviolet. Anthers brown or yellow. Stigmas yellow. Achenes obovate, flattened, mostly glabrous on the face, ciliate on the margin, without awns, with a broad shallow apical cleft. Chromosome number $n = 18$.

TYPE: Mexico, Baja California Sur: Picachos de Santa Clara, 13.6 mi nw. of San Ignacio-Abreojos road at a point 24.7 mi ne. of Punta Abreojos, 300 m, 24 Mar 1981, *C. Clark 585* (holotype: CAS; isotypes: DAV, CSPU, RSA, UC; all material is from the same plant).

PARATYPES: Mexico, Baja California Sur: n. slope and in arroyo,

Picachos de Santa Clara, 28 Dec 1975, *Moran 22758* (DAV, SD). Las Tinajas and vicinity in cerros e. of Los Picachos de Santa Clara, 21–23 Mar 1947, *H. S. Gentry 7560* (SD). Picachos de Santa Clara, Arroyo de los Picachos, 5–10 Nov 1947, *H. S. Gentry 7757* (SD).

Distribution and habitat. Existing collections of the species may correspond to only two populations. *Clark 585* and *Moran 22758* are from the same location. We suspect *Gentry 7757* is also from this location; Arroyo de los Picachos may be Arroyo Tecolote, which is the major southeast drainage of the range (Moran pers. comm.) and the location of the other two collections. *Gentry 7560* represents the other known population. It is possible that there are other undiscovered populations in this rugged mountain range, but the species does seem to be endemic to it.

The holotype grew along a dry stream-course. Over 100 plants were found up to 30 m higher on the gravely slopes above it, primarily on the north-facing shoulder of the southeastern-most peak. Surrounding vegetation was desert scrub, and *E. densifolia* was co-dominant with species of *Bursera, Ferocactus,* and *Lycium.*

Morphology. Encelia densifolia can easily be distinguished from other species in the genus. The peduncles are short enough that the heads are partially submerged in the leaves, a feature otherwise found only in *E. ventorum,* which has finely divided leaves (Kyhos et al. 1981). The remote dentation of the leaf margin and the obovate phyllaries are unique in the genus.

The phyllaries are the broadest in the genus. Werk and Ehleringer (1983) found that photosynthesis by phyllaries and paleae in *E. farinosa* and *E. californica* did not contribute much to the overall energy budget of the plant. We suspect the form of the *E. densifolia* phyllaries, in conjunction with the generally nodding fruiting heads, may be an adaptation for increased photosynthesis by exposing these organs to direct sunlight.

The leaf and phyllary pubescence consists of multicellular uniseriate hairs of the sort that are ubiquitous in the Heliantheae. The junctions between cells are slightly swollen (Fig. 5). Although the trichomes form a continuous covering over the surface, the leaves are not as reflective as those of other species such as *E. palmeri* and *E. farinosa* (Harrington and Clark unpubl.). The trichomes also are easily wettable, and are less reflective when wet. On foggy summer days, common in the region, the wet leaves would absorb more light for photosynthesis without adversely increasing water loss or leaf temperature.

Relationships. The ultraviolet-reflecting rays (Clark and Sanders 1986) and the possession of a suite of benzopyran and benzofuran secondary metabolites (Proksch and Clark 1987) are apomorphies

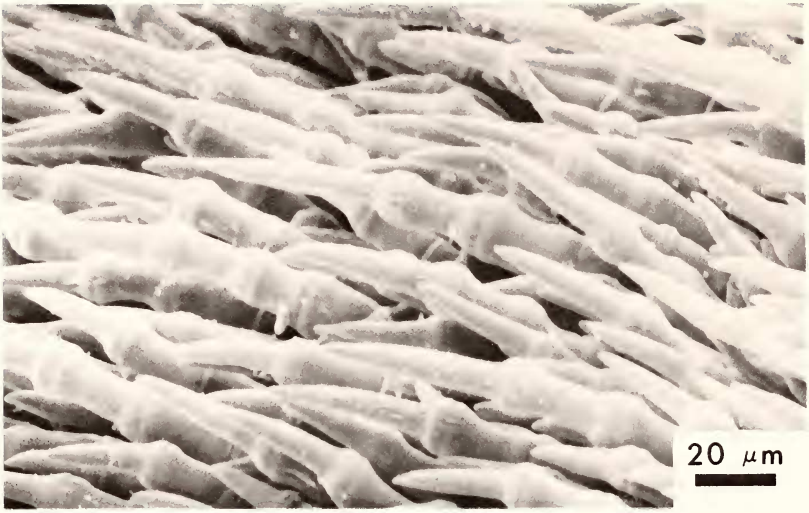


FIG. 5. Scanning electron micrograph of the trichomes of the adaxial leaf surface of *Encelia densifolia* (*Clark 585*).

linking *E. densifolia* to the clade containing the other Baja California species *E. farinosa, E. californica, E. palmeri, E. ventorum, E. conspersa,* and *E. asperifolia.* Its yellow discs are not found in other *Encelia* species of the region, and, along with other features, suggest that *E. densifolia* is basal in this clade (although its autapomorphies argue against any consideration of it as "primitive").

Hybridization. In cultivation, *E. densifolia* forms fertile hybrids with every other *Encelia* species to which it is crossed; all other *Encelia* species are equally interfertile (Kyhos et al. 1981). In the natural environment, it is sympatric with *E. farinosa* and occurs near *E. palmeri.* Although we saw no hybrids in the field, two collections [*Gentry 7559* (SD, UC), and *7587* (UC)] labeled "Encelia viscainoensis" appear intermediate between *E. densifolia* and one of these species. Progeny testing of several dozen achenes collected from an *E. densifolia* plant growing among *E. farinosa* yielded no hybrid plants, but we crossed the species in cultivation and obtained hybrids resembling "viscainoensis" in leaf morphology, so it is likely that the "viscainoensis" collections represent field hybrids between these species.

ACKNOWLEDGMENTS

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ANNOUNCEMENT

Oregon Endangered Species Program

In September, 1987, Oregon Senate Bill 533, popularly known as the Oregon Endangered Species Act, was passed into law. One of the provisions of this legislation is the establishment of a threatened and endangered species program under the direction of the state Department of Agriculture. This new program was activated in February of this year, with early goals being the development of rule-making procedures for state listing of threatened and endangered plants, the initiation of a review process to facilitate the ranking of candidate species, and the establishment of research projects focusing on biological aspects of rarity in the flora of the Pacific Northwest.

The Oregon Department of Agriculture is anxious to interact with individuals and organizations with an interest in the sensitive plant species of Oregon and adjacent states. Inquiries pertaining to the review process, listing procedures, research, or questions concerning particular taxa, should be addressed to: R. Meinke, Coordinator, Endangered Species Program, Plant Division, ODA, 635 Capitol Street NE, Salem, Oregon 97310-0110.